

What is claimed is:

1. A charging device comprising:

a charge roller adjoining or contacting a surface of a photoconductive element;

a DC voltage source configured to output a DC voltage;

an AC voltage source configured to output an AC voltage;

voltage applying means for superposing the DC voltage and the AC voltage and applying a resulting superposed voltage to said charge roller; and

waveform control means for causing said AC voltage source to generate the AC voltage having a waveform pattern of particular noise and a frequency lying in a preselected range.

2. The device as claimed in claim 1, wherein said waveform control means causes said AC voltage source to generate the AC voltage having a waveform pattern of white noise and having the frequency of between 500 Hz and 4,000 Hz.

3. The device as claimed in claim 2, further comprising a DSP (Digital Signal Processor) configured to generate the waveform pattern of particular noise, wherein said waveform control means causes said AC voltage source to output the AC voltage having the waveform pattern output

from said DSP.

4. The device as claimed in claim 2, further comprising a semiconductor memory storing the waveform pattern of particular noise, wherein said waveform control means causes said AC voltage source to generate the AC voltage having said waveform pattern stored in said semiconductor memory.

5. The device as claimed in claim 4, wherein said semiconductor memory stores a plurality of waveform patterns different in frequency from each other, and

said waveform control means causes said AC voltage source to selectively generate the AC voltage having any one of the waveform patterns stored in said semiconductor memory.

6. The device as claimed in claim 2, wherein said waveform control means causes said AC voltage source to generate the AC voltage digitally reproduced by sampling the waveform pattern of particular noise at a sampling frequency of 6 kHz or above.

7. The device as claimed in claim 1, wherein said waveform control means causes said AC voltage source to generate the AC voltage having a waveform pattern of pink noise and a frequency of between 500 Hz and 4,000 Hz.

8. The device as claimed in claim 7, further comprising a DSP configured to generate the waveform

pattern of particular noise, wherein said waveform control means causes said AC voltage source to output the AC voltage having the waveform pattern output from said DSP.

9. The device as claimed in claim 7, further comprising a semiconductor memory storing the waveform pattern of particular noise, wherein said waveform control means causes said AC voltage source to generate the AC voltage having said waveform pattern stored in said semiconductor memory.

10. The device as claimed in claim 9, wherein said semiconductor memory stores a plurality of waveform patterns different in frequency from each other, and

said waveform control means causes said AC voltage source to selectively generate the AC voltage having any one of the waveform patterns stored in said semiconductor memory.

11. The device as claimed in claim 7, wherein said waveform control means causes said AC voltage source to generate the AC voltage digitally reproduced by sampling the waveform pattern of particular noise at a sampling frequency of 6 kHz or above.

12. The device as claimed in claim 1, further comprising a DSP configured to generate the waveform pattern of particular noise, wherein said waveform control means causes said AC voltage source to output the AC voltage

having the waveform pattern output from said DSP.

13. The device as claimed in claim 12, wherein said waveform control means causes said AC voltage source to generate the AC voltage digitally reproduced by sampling the waveform pattern of particular noise at a sampling frequency of 6 kHz or above.

14. The device as claimed in claim 1, further comprising a semiconductor memory storing the waveform pattern of particular noise, wherein said waveform control means causes said AC voltage source to generate the AC voltage having said waveform pattern stored in said semiconductor memory.

15. The device as claimed in claim 14, wherein said semiconductor memory stores a plurality of waveform patterns different in frequency from each other, and

said waveform control means causes said AC voltage source to selectively generate the AC voltage having any one of the waveform patterns stored in said semiconductor memory.

16. The device as claimed in claim 14, wherein said waveform control means causes said AC voltage source to generate the AC voltage digitally reproduced by sampling the waveform pattern of particular noise at a sampling frequency of 6 kHz or above.

17. A process cartridge comprising:

a photoconductive element;

a cartridge case by which said photoconductive element is rotatably supported;

a charging device disposed in said cartridge case and configured to establish a potential difference between said charging device and said photoconductive element for thereby uniformly charging a surface of said photoconductive drum; and

a developing device disposed in said cartridge case and configured to feed toner to the surface of said photoconductive element;

said charging device comprising:

a charge roller adjoining or contacting the surface of said photoconductive element;

a DC voltage source configured to output a DC voltage;

an AC voltage source configured to output an AC voltage;

voltage applying means for superposing the DC voltage and the AC voltage and applying a resulting superposed voltage to said charge roller; and

waveform control means for causing said AC voltage source to generate the AC voltage having a waveform pattern of particular noise and a frequency lying in a preselected range.

18. An image forming apparatus comprising:

a process cartridge comprising a photoconductive element, a cartridge case by which said photoconductive element is rotatably supported, a charging device disposed in said cartridge case and configured to establish a potential difference between said charging device and said photoconductive element for thereby uniformly charging a surface of said photoconductive drum, and a developing device disposed in said cartridge case and configured to feed toner to said surface of said photoconductive element;

an optical scanning unit configured to optically scan the surface of said photoconductive element charged by said charging device; and

an image transferring device configured to transfer the toner from the surface of said photoconductive element to a recording medium;

said charging device comprising:

a charge roller adjoining or contacting the surface of said photoconductive element;

a DC voltage source configured to output a DC voltage;

an AC voltage source configured to output an AC voltage;

voltage applying means for superposing the DC

voltage and the AC voltage and applying a resulting superposed voltage to said charge roller; and

waveform control means for causing said AC voltage source to generate the AC voltage having a waveform pattern of particular noise and a frequency lying in a preselected range.

19. An image forming apparatus comprising:

a photoconductive element;

a charging device configured to establish a potential difference between said charging device and said photoconductive element for thereby uniformly charging a surface of said photoconductive element, said charging device comprising a charge roller adjoining or contacting a surface of said photoconductive element, a DC voltage source configured to output a DC voltage, an AC voltage source configured to output an AC voltage, voltage applying means for superposing said DC voltage and said AC voltage and applying a resulting superposed voltage to said charge roller, and waveform control means for causing said AC voltage source to generate said AC voltage having a waveform pattern of particular noise and a frequency lying in a preselected range;

an optical scanning device configured to optically scan the surface of said photoconductive element charged by said charging device;

a developing device configured to transfer toner to the surface of said photoconductive element scanned by said optical scanning device; and

an image transferring device configured to transfer the toner from the surface of said photoconductive element to a recording medium;

20. A copier comprising:

an image reading device configured to read a document image; and

an image forming apparatus configured to form an image on a recording medium in accordance with image data output from said image reading device;

said image forming apparatus comprising:

a process cartridge comprising a photoconductive element, a cartridge case by which said photoconductive element is rotatably supported, a charging device disposed in said cartridge case and configured to establish a potential difference between said charging device and said photoconductive element for thereby uniformly charging a surface of said photoconductive drum, and a developing device disposed in said cartridge case and configured to feed toner to said surface of said photoconductive element;

an optical scanning unit configured to optically scan the surface of said photoconductive element charged



by said charging device; and

an image transferring device configured to transfer the toner from the surface of said photoconductive element to a recording medium;

said charging device comprising:

a charge roller adjoining or contacting the surface of said photoconductive element;

a DC voltage source configured to output a DC voltage;

an AC voltage source configured to output an AC voltage;

voltage applying means for superposing the DC voltage and the AC voltage and applying a resulting superposed voltage to said charge roller; and

waveform control means for causing said AC voltage source to generate the AC voltage having a waveform pattern of particular noise and a frequency lying in a preselected range.

21. A copier comprising:

an image reading device configured to read a document image; and

an image forming apparatus configured to form an image on a recording medium in accordance with image data output from said image reading device;

a photoconductive element;

a charging device configured to establish a potential difference between said charging device and said photoconductive element for thereby uniformly charging a surface of said photoconductive element, said charging device comprising a charge roller adjoining or contacting a surface of said photoconductive element, a DC voltage source configured to output a DC voltage, an AC voltage source configured to output an AC voltage, voltage applying means for superposing said DC voltage and said AC voltage and applying a resulting superposed voltage to said charge roller, and waveform control means for causing said AC voltage source to generate said AC voltage having a waveform pattern of particular noise and a frequency lying in a preselected range;

an optical scanning device configured to optically scan the surface of said photoconductive element charged by said charging device;

a developing device configured to transfer toner to the surface of said photoconductive element scanned by said optical scanning device; and

an image transferring device configured to transfer the toner from the surface of said photoconductive element to a recording medium.